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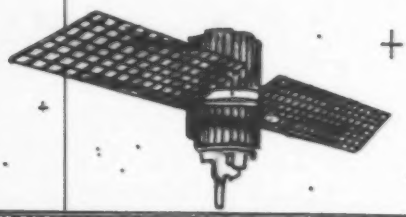
1988/89
Overview

1988-1989 OVERVIEW

Scientific Activities of the Government of Alberta



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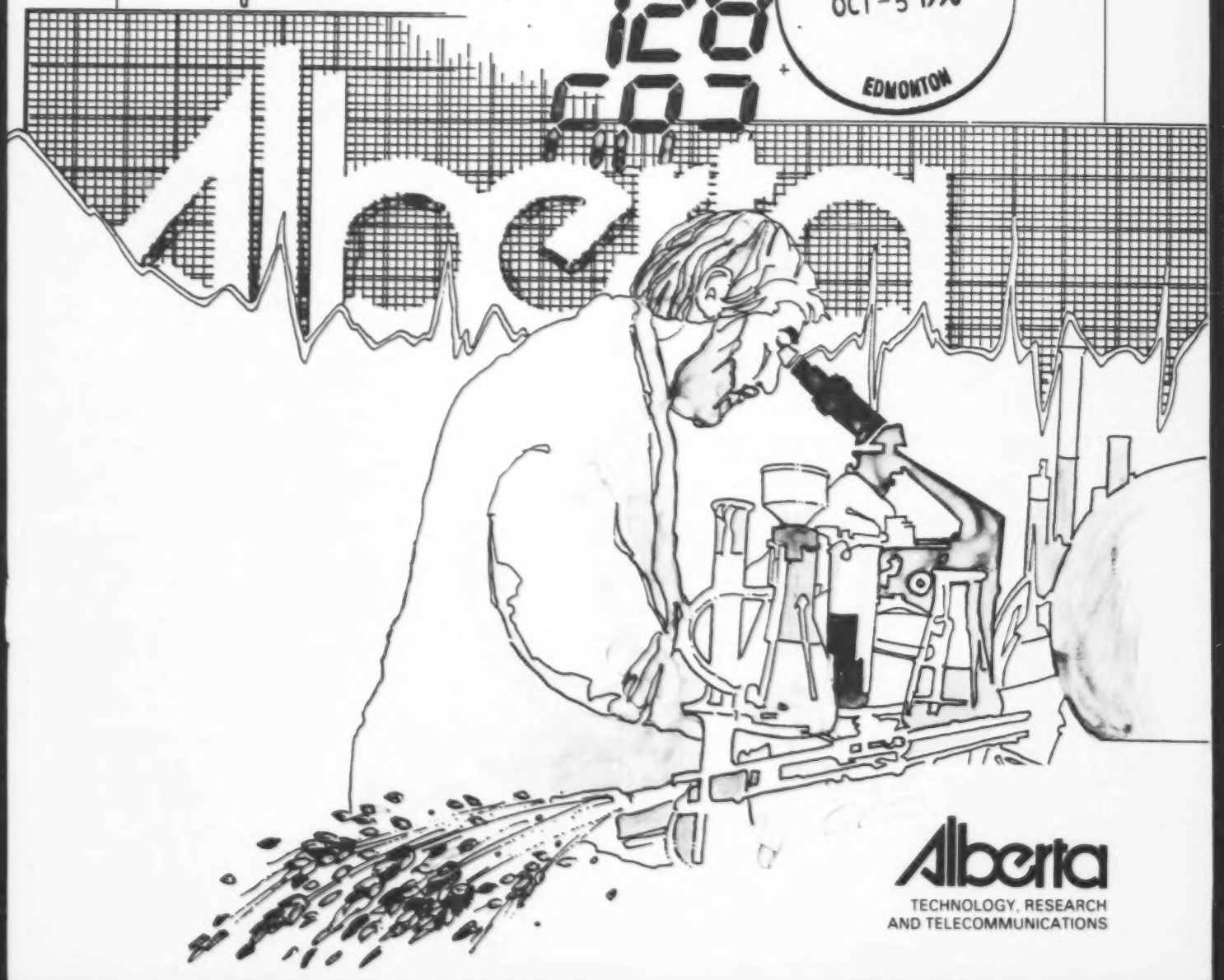

Alberta
TECHNOLOGY, RESEARCH
AND TELECOMMUNICATIONS

91-00419/

I. Introduction

The Provincial Government invests in science and technology that supports its public policy objectives in health improvement, environmental protection, industrial and social development, and the advancement of local scientific competence. Its science agenda is the sum of the programs and budgetary allocations of several departments and agencies. Technology, Research and Telecommunications, in co-operation with Statistics Canada, conducts an annual survey of the Government's science activities. This publication is a brief overview of the results of the 1988-89 survey.

On its own, this survey offers a series of indicators of provincial government expenditures, the allocation of those expenditures, human resources, and provincial priorities/objectives in the scientific arena. These provincial indicators can provide significant input to policy formulation and program evaluation when used in conjunction with the indicators generated from companion surveys (to be published at a later date), in particular those relating to the federal government, the private sector, universities, and private non-profit institutions.

The term "indicator" is used deliberately. Specifically, a number of problems exist with data relating to science activities, including: definitions, year-to-year consistency and measurement. Consequently, the reader should be alerted to an estimated confidence interval of ± 15 per cent. It should also be noted that surveys involving different respondents (ie. funders vs performers) can yield substantially different results. While Technology, Research and Telecommunications and Statistics Canada are working to resolve these limitations, and while the data does offer reasonable order of magnitude estimates, caution is urged in drawing conclusions which exceed the rigor of the data.

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II. Objectives of Science Expenditures

Industrial development, health and energy were the main targets of 1988-89 science expenditures. As described in Table 1, activities in fulfillment of these three objectives accounted for 74 per cent of the year's science spending, $173.1 million of 234.4 million.

As well, industrial development, health and energy were the focus of the Government's research and development agenda, absorbing $140.5 million (92%) of the $152.6 million spent on all R&D. Related science activities (RSA) accounted for 19 per cent of government spending in these three priorities, including such activities as demonstration projects, pilot process plants and technical studies.

The priority of industrial development was manufacturing, i.e. initiatives to encourage the production of new goods and services. Note that manufacturing R&D captured about 19 per cent of all science expenditures. Energy science dollars were directed toward fossil fuels projects. Research and development related to the exploration, extraction or refining of natural gas, crude oil and coal captured 89 per cent of the energy science expenditures and 15 per cent of the year's total science dollars. Expenditures related to health are predominantly basic medical research for the prevention and treatment of physical diseases. The Alberta Heritage Foundation for Medical Research provided $37.6 million of the total health related science funds.

The three main objectives depend on natural sciences and engineering capabilities, historically the dominant area of Alberta's science agenda. The social sciences commanded about 12.5 per cent of this year's science expenditures. As shown in Table 1, social development science activities were aimed at community enrichment, for example, the museums programs included under culture or urban and regional development initiatives. Also under the social development umbrella are government planning tools, such as studies on labour force demands and re-training programs and the creation of statistical forecasting models.

Table 1. Objectives of Science Expenditures of the Provincial Government in 1988-89

($ in '000s)

Objective	R&D	RSA	TOTAL $	%
Industrial & economic development	**63,306**	**23,207**	**86,513**	**37**
manufacturing	45,509	7,527	53,036	
agriculture	14,394	9,553	23,947	
forestry	2,816	1,250	-	
minerals	-	582	582	
fisheries	259	156	415	
other	328	4,139	4,467	
Health	**41,753**	**6,147**	**47,900**	**20**
Energy	**35,425**	**3,310**	**38,735**	**16.5**
fossil fuels	34,636	2,768	37,404	
conservation	148	5	153	
renewable resources	-	116	116	
other	641	421	1,062	
Social development	**6,154**	**17,879**	**24,033**	**10**
culture, sport, recreation	3,114	3,381	6,495	
education	491	5,702	6,193	
urban & regional studies	137	2,479	2,616	
human resources	160	1,017	1,177	
other	2,252	5,300	7,552	
Environmental issues	**2,842**	**20,221**	**23,063**	**9.8**
land information systems	800	15,000	15,800	
water	798	2,585	3,383	
air	553	889	1,442	
land	468	211	679	
other	223	1,536	1,759	
Transportation	**1,746**	**8,900**	**10,646**	**4.5**
Wildlife	**1,145**	**1,652**	**2,797**	**1.2**
Other	**252**	**505**	**757**	
TOTAL	152,623	81,821	234,444	

III. Major Funders and Performers

Various departments and agencies shape the government science agenda as performers and/or funders of research and related activities. Those with science expenditures exceeding $1 million are listed in Table 2. The year's science agenda was largely the product of TRT, AHFMR and AOSTRA which collectively accounted for 53 per cent of total expenditures. Note that these three organizations are essentially funders of research that is performed by the university and industry sectors.

Technology, Research and Telecommunications (TRT) was the main financier of manufacturing science and technology development, supplying $53 million toward that objective. The technology development was done by the universities and industry, and by the Alberta Research Council (ARC) of which TRT is the principal funder. TRT was the source for one out of three science dollars flowing to the private sector and one out of five dollars to the universities in 1988-89.

The Alberta Heritage Foundation for Medical Research (AHFMR) has been the mainstay of medical research funding since its creation in 1979. Its awards to university scientists in 1988-89 accounted for $2 out of $3 for university performed research. In relation to the government's objective of health improvement, AHFMR awards constituted about 80 per cent of the total expenditure. Other participants in the health agenda included the Environment ministry which used $3.4 million of its science budget for health related research and Health which contributed $5.7 million. Approximately $2 million for hospital-based medical research flowed through Health to the Alberta Cancer Board. Note that clinical research activities of hospitals were funded indirectly via the department's operating grants and are not included in this survey.

The Alberta Oil Sands Technology and Research Agency (AOSTRA), is the major source of government awards and contracts to industry for fossil fuels science and technology. About half of its 1988-89 research budget was delegated to the private sector. Alberta Energy shows a comparable reliance on industry. These two organizations provided $18.2 million or 37 per cent of the total government science dollars spent in the private sector.

The other departments and agencies listed in Table 2 are essentially performers, consuming two thirds to 90 per cent of their science budgets on intramural activities. In dollars, the largest science establishments within government were: Forestry, Lands & Wildlife, Agriculture, Culture & Multiculturalism, Transportation & Utilities and the Environmental Centre. The in-house science agendas of the first four departments were tied to their own program and policy needs. In contrast, the Environmental Centre is a service organization for other departments; in 1988-89, it addressed the research requirements of Agriculture, Forestry, Lands and Wildlife and Health.

In the aggregate, intramural expenditures of government absorbed 37 per cent of the year's science budget. Universities were the leading extramural performers, capturing 23 per cent of science expenditures; industry accounted for 21 per cent, while the ARC accounted for 13 per cent.

Table 2. Major Funders and/or Performers of the 1988-89 Provincial Government Science Agenda

($ in '000s)

Department or Agency	Total Science $	In-House	Industry	University	ARC	Other
TRT	53,000	482	15,504	11,301	23,650	40
AHFMR	37,623	1,376	-	33,313	-	2,934
AOSTRA	32,957	8,009	15,964	3,535	4,714	735
Forestry, Lands & Wildlife	20,092	15,407	5,421	314	822	128
Agriculture	20,776	14,830	1,112	2,330	723	1,781
Environmental Centre	11,126	10,143	800	103	75	5
Environment	6,556	3,749	1,569	30	174	1007
Transportation & Utilities	9,659	8,480	233	148	347	451
Health	5,788	2,414	438	1,311	179	1446
Culture & Multiculturalism	4,799	4,559	192	22	-	26
Energy	4,527	916	2,246	399	727	239
Municipal Affairs	3,922	3,263	532	-	-	127
Economic Dev. & Trade	3,478	2,490	930	20	-	38
Solicitor General	2,526	1,577	949	-	-	-
Advanced Education	2,176	492	-	1494	-	190
Education	2,139	1,370	258	190	5	316
Bureau of Statistics	1,932	1,606	326	-	-	-
Tourism	1,920	378	1,542	-	-	-
Career Dev. & Employment	1,588	1,132	182	29	-	245
Labour	1,339	918	421	-	-	-
Recreation & Parks	1,044	624	316	92	-	12
Others*	3,477	2,759	116	165	-	437
TOTAL	234,444	86,947	49,078	54,796	31,416	12,180

*Attorney General, AADAC, Consumer & Corporate Affairs, Family & Social Services, Occupational Health & Safety, Environment Council

IV. Human Resources

There is a human resources component to the intramural science expenditures. Salaries to scientists, technicians and administrative personnel accounted for $62.5 million (72 per cent) of intramural expenditures in 1988-89. Major employers of science personnel, those departments with 100 or more such employees, are shown in Table 3. As expected, the five departments with the largest in-house science budgets have the largest concentration of scientific talent. In 1988-89, they employed three out of four people of the government's science work force.

R&D personnel constituted 23 per cent of the science professionals, technicians and auxiliary staff. In-house R&D tends to be concentrated in the natural sciences and engineering fields, the science capabilities most prominent in environmental and agricultural research and paleontology. The vast majority (70 per cent) of science employees performed RSA. Their work spanned an array of information services such as technical/statistical surveys, mapping services, feasibility studies, testing and standards calibration. Throughout the 80's, the government's science work force has engaged predominantly in RSA. Staff associated with the administration of external science programs comprised 7 per cent of the government's science labour force.

Table 3. Science Personnel Employed by the Provincial Government, 1988-89

(In Full-Time Equivalents)

Department or Agency	R&D	RSA	AEP[1]	TOTAL
Agriculture	142	271	12	425
Culture & Multiculturalism	75	74	-	149
Environment [2]	100	207	7	314
Forestry, Lands & Wildlife	45	236	39	320
Transportation & Utilities	11	163	3	177
Other	51	354	67	472
TOTAL	424	1,305	128	1,857

[1] administration of external programs
[2] includes the Centre, Department and Council

V. Comparisons of Annual Expenditures

Scientific expenditures in 1988-89 were $8.4 million less than in 1987-88, a 3.5 per cent decrease. Major declines occurred in the science budgets of Environment (down $8.1 million) and AHFMR (down $23.5 million). These were offset by a change in reporting by Forestry, Lands & Wildlife which included land information services ($15.8 million) for the first time in its 1988-89 report. Historical revisions to the data will result in a larger annual decrease in science spending.

In a larger perspective, Government science expenditures have declined 30 per cent between 1986-87 and 1988-89, a loss of approximately $99 million. The majority of this change was caused by real decreases in the science activities of Environment, AHFMR and AOSTRA, a combined drain of about $76 million over the three years. Some of the decrease in science expenditures is attributed to changes in reporting by two departments, Culture & Multiculturalism and Health. Adjustments to their historical data will occur during the 1989-90 survey to provide more accurate overall comparisons.

Science expenditures have also decreased in relative terms. Table 4 tracks the percentage of government budgetary expenditures allocated to scientific activities during the 80's.

Table 4. Annual Science Expenditures as a Percentage of Provincial Government Budgetary Expenditures

Expenditures	1980-81	1982-83	1984-85	1986-87	1988-89
Science $ in '000s	119.9	212.8	276.7	333.4	234.4
Science % of all budgetary expenditures	2.1	2.3	3.0	3.1	2.1